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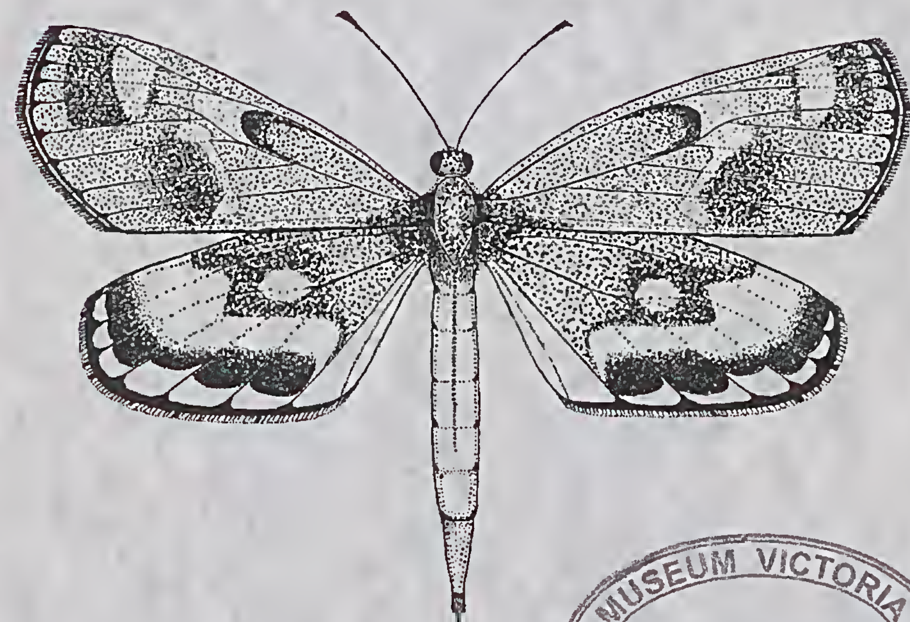

News Bulletin of The Entomological Society of Victoria Inc.

THE ENTOMOLOGICAL SOCIETY OF VICTORIA (Inc)

MEMBERSHIP

Any person with an interest in entomology shall be eligible for Ordinary membership. Members of the Society include professional, amateur and student entomologists, all of whom receive the Society's News Bulletin, the Victorian Entomologist.

OBJECTIVES

The aims of the Society are:

(a) to stimulate the scientific study and discussion of all aspects of entomology,
(b) to gather, disseminate and record knowledge of all identifiable Australian insect species,
(c) to compile a comprehensive list of all Victorian insect species,
(d) to bring together in a congenial but scientific atmosphere all persons interested in entomology.

MEETINGS

The Society's meetings are held at the 'Discovery Centre', Lower Ground Floor, Museum Victoria, Carlton Gardens, Melway reference Map 43 K5 at 8 p.m. on the third Tuesday of even months, with the exception of the December meeting which is held on the second Tuesday. Lectures by guest speakers or members are a feature of many meetings at which there is ample opportunity for informal discussion between members with similar interests. Forums are also conducted by members on their own particular interest so that others may participate in discussions.

SUBSCRIPTIONS (2008)

Ordinary Member	\$30 (overseas members \$32)
Country Member	\$26 (Over 100 km from GPO Melbourne)
Student Member	\$18
Electronic (only)	\$20
Associate Member	\$ 7 (No News Bulletin)
Institution	\$35 (overseas Institutions \$40)

Associate Members, resident at the same address as, and being immediate relatives of an ordinary Member, do not automatically receive the Society's publications but in all other respects rank as ordinary Members.

LIFE MEMBERS: P. Carwardine, Dr. R. Field, D. Holmes, Dr. T. New, Dr. K. Walker.

Cover design by Alan Hyman.

Cover illustration: The pale Sun Moth, *Synemon selene* Klug, is an endangered species restricted to perennial grassland dominated by *Austrodanthonia* in Western Victoria. It is now extinct in SA, and was presumed extinct in Vic. until its rediscovery, in February 1991, by the late Frank Noelker and Fabian Douglas. The Victorian Populations are parthenogenetic with all specimens comprising females, a most unusual trait in the Castniidae. Illustration by Michael F. Braby.

Minutes of the Annual General Meeting 15 April 2008

Present: P. Carwardine, D. Dobrosak, I. Endersby, K. Harris, P. Lillywhite, P. Marriott, D. Stewart, G. Weeks

Visitors: A. Atkins, S. Bendel, J. Beynon, N. Beynon, B. Ednie, K. Ellis, M. Endersby, J. Greer, M. Holloway, R. Ireland, S. Leber, T. Marriott, J. Mason, K. Mather, L. Mather, J. Matthews, E. Mayfield, R. Mayfield, M. Moir, K. Nolan, F. Roche, N. Sherwin, C. Sturt, D. Sturt, J. Ulmann.

Apologies: M. Birtchnell, S. Curle, L. Gibson, K. Walker.

Minutes:
Minutes of the previous Meeting [*Vic. Ent.* 38(3): 27] were accepted. I. Endersby moved, P. Carwardine seconded

Correspondence:

- Correspondence was received from Prof. Hoffman recommending the Society should record insect/invertebrate taxa range extensions/changes as indicators of Climate Change.

Treasurers Report:
General Account $853 Le Souëf Account $4,778 excluding costs associated with the February issue of *Victorian Entomologist*.

Editors report:
D. Dobrosak advised M. Birtchnell has previous commitments for the next few months and will take over the role of Editor from the October issue.

Presenters:

Enid Mayfield
Enid Mayfield is a scientific illustrator specialising in plant illustration and based at the Geelong Botanic Gardens and Herbarium at the Royal Botanic Gardens, Melbourne. Enid presented a fascinating and richly illustrated talk on pollinators, commencing with an introduction to the mechanism of pollination and its development from wind pollination to the sophisticated methods that are perhaps exemplified in the relationships between orchids and the insects that pollinated them.
A synopsis of Enid's talk will be printed in a future issue of *Vic. Ent.*

Kate Nolan
Kate works as a natural history illustrator and has worked with Museum Victoria as well as presenting insect illustration courses. At short notice, Kate brought in some of her beautiful watercolours to show to the meeting and answer some of the many questions that were asked on techniques and materials used.

Both presenters were warmly thanked for coming to the meeting and for their presentations

Meeting Closed: 9:25pm

Checklist of the Victorian ghost moths (Lepidoptera, Ditrysia, Hepialidae)

Axel Kallies (1) & Fabian Douglas (2)

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Introduction

The Hepialidae (ghost moths or swift moths) belong to the relatively primitive group of homoneurous Lepidoptera, in which the fore and hind wings display a very similar arrangement of veins. This is in contrast to the more advanced heteroneurous Lepidoptera to which the majority of moth families and all butterfly families belong and which display pronounced reductions or fusions of their hindwing veins while the forewing venation is more complete.
The world fauna of Hepialidae comprises roughly 500 species of which about 120 have been found in Australia, almost all of which are endemic (Nielsen, 1996). Hepialidae are most successful and species rich in the wetter parts of Australia although some genera such as *Trictena* Meyrick, 1890, *Bordaia* Tindale, 1932, *Abantiades* Herrich-Schäffer, 1855 and *Fraus* Walker, 1856 have adapted well to the drier conditions of the inland. While the larger and attractive species of genera such as *Abantiades*, *Trictena* and *Aenetus* Herrich-Schäffer, 1855 were described by early taxonomists, the majority of the Australian and Victorian hepialids, which belong to less striking genera such as *Fraus* and *Oncopera* Walker, 1856 or *Oxycanus* Walker, 1856, were described later, in particular by Tindale (1932, 1933, 1935, 1941, 1955, 1964) and Nielsen & Kristensen (1989). The current taxonomy of the Australian Hepialidae was established by Nielsen (1996).

The larger hepialid moths are among the better-known insects, as some of the biggest moths in Australia belong to this family and these larger species can sometimes occur in great numbers, particularly on wet autumn nights. Hepialidae are therefore sometimes referred to as 'rain moths'. The larvae of the larger Australian species are also eagerly sought by recreational fishermen and are known colloquially as 'bardi grubs' (also compare Zborowski & Edwards, 2007). The biology of only a limited number of Australian Hepialidae is known in detail (compare Common, 1990) and despite the familiarity of some species, much needs to be learned about their biology. For instance, it is still unknown how long it takes for even some of the most common species to complete their life cycles.

We here publish a checklist of the Victorian Hepialidae, which comprises 47 species, 8 of which are recorded for the state Victoria for the first time. Thus, the hepialid fauna of Victoria is one of the richest in Australia as it represents more than a third of the Australian species. This checklist is mainly based on the collections of the Australian National Insect Collection (ANIC) and the Museum of Victoria, Melbourne (MV) as well as the papers published by Tindale (1933, 1935, 1964) and Nielsen & Kristensen (1989). It also takes into account the catalogue of Victorian Heterocera, which was published by Lower (1893) and the species listed by Edwards (2007) in the internet based Australian Faunal Directory. Additional records derive from the private collections of Peter Marriott (Melbourne), Douglas Hilton (Warrandyte) and the authors. The fauna of Hepialidae in Victoria can be considered as relatively well-known, although a small number of additional species can still be expected to be found, in particular in the north-west of the state as well as in East Gippsland and the alpine areas of the north and north-east. We consider this list part of the project 'Checklists of Victorian moths and butterflies' (compare Marriott *et al*., 2007).

Checklist

New records for Victoria are marked **. Other species, which are commented on are marked *.

FRAUS Walker, 1856
bilineata Walker, 1865
tedi Nielsen & Kristensen, 1989
marginispina Nielsen & Kristensen, 1989**
orientalis Nielsen & Kristensen, 1989**
pteromela (Lower, 1892)
linogyna Nielsen & Kristensen, 1989*
nanus (Herrich-Schäffer, [1853])
fusca (Lucas, 1891)
crocea (Lucas, 1891)
simulans Walker, 1856
polyspila (Meyrick, 1890)
griseomaculata Nielsen & Kristensen, 1989

AENETUS Herrich-Schäffer, 1855
ligniveren (Lewin, 1805)
eximia (Scott, 1869)
blackburnii (Lower, 1892)**
montanus Tindale, 1953**

ONCOPERA Walker, 1856
alpina Tindale, 1933
intricoides Tindale, 1933
fasciculatus (Walker, 1869)
rufobrunnea Tindale, 1933

TRICTENA Meyrick, 1890
atripalpis (Walker, 1856)

BORDAIA Tindale, 1932
pica Tindale, 1932**
paradoxa Tindale, 1932**

ABANTIADES Herrich-Schäffer, 1855
barcas (Pfitzner, 1914)
leucochiton (Pfitzner, 1914)
marcidus Tindale, 1932
hyalinatus (Herrich-Schäffer, [1853])
labyrinthicus (Donovan, 1805)
magnificus (Lucas, 1898)
latipennis Tindale, 1932

ELHAMMA Walker, 1856
australasiae (Walker, 1856)

JEANA Tindale, 1935
delicatula Tindale, 1935

OXYCANUS Walker, 1856
australis Walker, 1856
dirempta (Walker, 1865)
loesus Tindale, 1935
lyelli Tindale, 1935*
antipoda (Herrich-Schäffer, [1853])
janeus Tindale, 1935**
silvanus Tindale, 1935
rosaceus Tindale, 1935
stellans Tindale, 1935
rufescens Walker, 1856*
goodingi Tindale, 1935
niphadias Meyrick, 1889**
sirpus Tindale, 1935
subvaria (Walker, 1856)
hildae Tindale, 1964*

Comments

Fraus marginispina Nielsen & Kristensen, 1989
This species was described from a number of localities in South Australia (Nielsen & Kristensen, 1989). The first specimens from Victoria were collected by one of us (FD) at Rainbow in NW Victoria, in the 1980s. Subsequently, more specimens of *F. marginispina* were collected by FD near Lake Hindmarsh, at 15 km WSW of Rainbow. The species is moderately common in wet years and is attracted to light regularly in April and May.

Fraus orientalis Nielsen & Kristensen, 1989
F. orientalis was known only from New South Wales. In recent years a single specimen, which most likely belongs to this species, was taken by Peter Marriott in the Wilsons Promontory National Park. Unfortunately, only the wings of the specimen were kept as a record.

Fraus linogyna Nielsen & Kristensen, 1989
This species is known from coastal NSW with a single record from Mallacoota in Victoria (Nielsen & Kristensen, 1989). A female, which appears to belong to *F. linogyna*, was taken by one of us (AK) in a button grass swamp in the Grampians in March 2008. More material from this locality would be crucial to clarify the identity of this specimen.

Aenetus blackburnii (Lower, 1892)
This beautiful species is known mainly from South Australia. The only records from Victoria are from Dimboola, where two females were taken by Mr. O. Williams in the 1990s. The specimens were seen by FD in Mr. Williams' collection but their current whereabouts are unknown. Both of these specimens were collected after they came to light in February.

Aenetus montanus Tindale, 1953
A. montanus is known from NSW and the ACT. In December 2007 this species was found by AK in the Victorian Alps on the Bogong plains in the vicinity of Falls Creek. The larvae were relatively common in the young shoots of snow gums, *Eucalyptus pauciflora* (ssp. *hedraia*) that were severely burnt in the Alpine bush fires in summer 2003. The fires killed most of the trunks of the snow gums but promoted young growth from the base. These young shoots are obviously favoured by *A. montanus* larvae. They can be easily found 50-100 cm above ground below their gall from which frass is expelled in large quantities. The flight time of this species appears to be in November or earlier as only a few old exuviae could be found by the end of December. The development of *A.*

montanus seems to require at least 2 years. Small caterpillars as well as apparently full-grown larvae were found. The latter remove the web from the gall, which usually covers the exit hole. About 30 larvae are currently in the care of AK but adult specimens from Victoria are not in collections yet. Frass and damage on snow gum, which most likely was caused by *A. montanus*, was also observed by Doug Hilton (Warrandyte) near Hotham in 2006.

Bordaia pica Tindale, 1932
This species was described from South Australia but it was also known from Western Australia. The first specimens from Victoria were collected by FD in the 1980s at Rainbow, in the NW of Victoria. After this initial discovery, a few more specimens were collected by FD near Lake Hindmarsh, at 15 km WSW of Rainbow. Males are occasionally attracted to light on mild and wet nights in mid April. Females are also attracted to light but much less frequently. Victorian specimens of this species were placed in ANIC and in the collections of the authors. This species was already mentioned for the Victorian fauna by Edwards (2007) based on the records published here.

Bordaia paradoxa Tindale, 1932
This species was described from Western Australia. The only specimen from Victoria, a female, was collected in the 1980s by FD at Rainbow in the NW of Victoria.

Oxycanus lyelli Tindale, 1935
This species was described from the vicinity of Gisborne. It appears to be closely related or identical with *O. dirempta*, which we found to be common and highly variable around Melbourne. The type material of *O. lyelli* should be examined to verify the validity of this taxon.

Oxycanus rufescens Walker, 1856
This species was described from Tasmania. Tindale (1935) considered a junior synonym of *Oxycanus sordidus* (Herrich-Schäffer, [1853]), which, however, was later found to be a synonym of *Oxycanus antipoda* (compare to Nielsen, 1996). Tindale (1935) reported it from several localities in Victoria. In recent times only a single specimen, which corresponds to *O. rufescens* (as used by Tindale, 1935) was collected by Russell Best in Riddells Creek. The type material of *O. rufescens* should be examined in order to confirm the identity of this taxon.

Oxycanus janeus Tindale, 1935
This species was described from Tumbarumba, New South Wales. A number of specimens from Bindaree Hut (Mount Buller) and Buchan are present in the ANIC and MV and their identity was established by AK through genitalia examination.

Oxycanus niphadias Meyrick, 1889
This species was known only from South Australia. The only records from Victoria are from Halls Gap in the Grampians where this species was taken by David Holmes in April 1984. The specimens are now in coll. MV and their identity was established by AK through genitalia examination. Other specimens from Victoria (in coll. ANIC), which were identified as *O. niphadias* by Tindale, were subsequently found to belong to *O. goodingi*. *O. niphadias* (as *Porina niphadias*) was mentioned by Lower (1893) for Victoria. These records, however, also relate to *O. goodingi* (Edwards *in litt.*).

Oxycanus hildae Tindale, 1964
This species is unknown to the authors but it was originally described from Jacob Creek, Victoria (Tindale, 1964). Two specimens identified as *O. hildae* by Tindale (in ANIC) were found to be very similar to *O. subvaria* both externally and in genitalia. The type material of *O. hildae* in the South Australian Museum should be examined.

Acknowledgements

We are grateful to Peter Marriott (Bentleigh), Doug Hilton (Warrandyte), O. Williams (Dimboola), Ken Walker (Museum Victoria, Melbourne), Marianne Horak and Ted Edwards (both Australian National Insect Collection, Canberra) for permission to examine material under their care. We further wish to thank Russell Best, Riddells Creek, for providing us with some important records and photographs and Peter Marriott for allowing us to reproduce some of his wonderful photographs. We also very much appreciate the valuable comments on an earlier version of this article made by Ted Edwards. Finally, we wish to express our thanks to the Department of Sustainability and Environment and Parks Victoria for issuing research permits to collect in Victorian National Parks.

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Plate 1

1. *Fraus griseomaculata*, female, Tynong N, 11.Apr.2008, A.Kallies & P.Marriott. **2.** *Fraus crocea*, male, same data. **3.** *Aenetus ligniveren*, male, Warrandyte, 24.Dec.2006, ex larva, A.Kallies. **4.** Ditto, female, Gembrook, 6.Jan.2005, P.Marriott. **5.** *Aenetus montanus*, larva in *Eucalyptus pauciflora*. **6.** Habitat of *Aenetus montanus*, Mt Cope, ca 1600m, 2.Jan.2008, A.Kallies. **7.** *Fraus marginispina*, male, Rainbow, 13.Apr.2005, F.Douglas. **8.** *Bordaia pica*, male, Rainbow, 3.Apr.1997, F.Douglas. All photos by Peter Marriott, except from Figs 3, 5, 6, 8, by Axel Kallies.

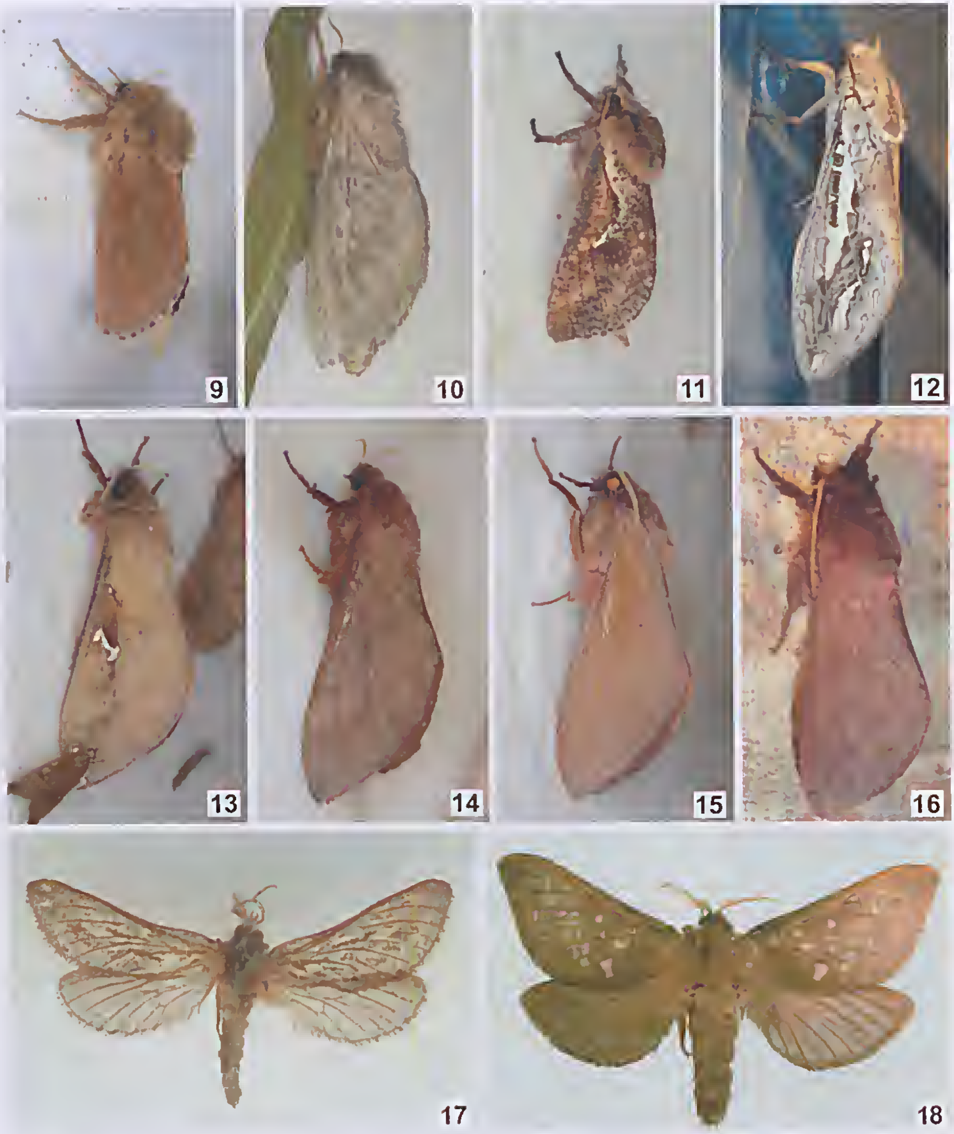

Plate 2

9. *Oncopera rufobrunnea*, male, Upper Beaconsfield, 5.Dec.2005, A.Kallies & P.Marriott. 10. *Jeana delicatula*, female, Kallista, 29.Apr.2006, P.Marriott. 11. *Elhamma australasiae*, male, Black Snake Range, 3.Feb.2007, A.Kallies & P.Marriott. 12. *Abantiades marcidus*, male Seymour, 29.Mar.2008, P.Marriott. 12. *Oxycanus sirpus*, male, colour form, Black Snake Range, 21.Apr.2007, A.Kallies & P.Marriott. 13. ditto, male, colour form, Tynong N, 11.Apr.2007, A.Kallies & P.Marriott. 14. *Oxycanus rosaceus*, male, Black Snake Range, 21.Apr.2007, A.Kallies & P.Marriott. 16. *Oxycanus rufescens*, male, Riddells Creek, 20. May 2008, R.Best. 17. *Jeana delicatula*, male, Red Hill, 12. May 1958, D.Holmes. 18. *Oxycanus janeus*, male, Bindaree Hut, Howqua River, 1000m, 15.Apr.1975, T.Morton. All photos by Peter Marriott, except from Fig. 16, by Russel Best, Fig. 18, by Axel Kallies.

A note on the occurrence of *Junonia orithya* (Linnaeus, 1758) in the Federated States of Micronesia (Lepidoptera, Nymphalidae)

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The nymphalid butterfly *Junonia orithya* (Linnaeus, 1758) occurs from the Afrotropical Region, Arabia, Sri Lanka, India, Indo-China, China and the Malay Peninsula to Borneo, the Philippines, Sulawesi, Maluku, Papua New Guinea and Australia. A large number of races have been described, especially in the eastern part of its range (see Fruhstorfer, 1912; Tsukada, 1985) and some might be considered to be of dubious validity. Honey & Scoble (2001: 357) designated a lectotype for *orithya* and questioned the validity of subspecific descriptions in a species with such strong migratory habits. However, although racial characteristics are obscured to some degree by individual and seasonal variation, some geographical variation appears to be constant. For example, female phenotypes are largely "blue" in some localities and "non-blue" in others, whilst other populations appear to have dimorphic females. Females from the southern Moluccas appear to have rather unusual enlarged hindwing ocelli.

The first mention of the occurrence of *Junonia orithya* from western Micronesia was by Kelvyn Dunn, who in an unpublished manuscript (Dunn, 2004) reported the species as locally common around Chamorro Bay, Colonia (Yap) in July 2003. Tennent (2006: 84) cited this record as "*Junonia orithya* ssp." and added (Tennent, 2006: 182) that Don Buden, College of Micronesia, saw several specimens on grassy roadsides outside Colonia during seven weeks spent on Yap between June and August 2005, and also saw the species in a weedy seepage area in the central uplands of Yap island in June of that year. Based on photographs supplied to the author by Kelvyn Dunn, the opinion was ventured (Tennent, 2006: 183) that the Yap population might represent an undescribed race of *J. orithya*.

At the request of the author, Don Buden very kindly collected a short series of *J. orithya* on Maap Island (Yap: Federated States of Micronesia) on Christmas Day 2007. These have been compared with long series of *J. orithya* from localities throughout its wide range. The specimens are - perhaps predictably for a small island population - rather small in size, but are otherwise similar in all significant respects to *J. o. leucasia* Fruhstorfer, 1912 (TL: Luzon, Philippines), which flies throughout the Philippines, with the exception of Sibutu (Treadaway, 1995: 28). The series of 6 males and 3 females, now in the Natural History Museum (BMNH), London, are confidently placed with *J. o. leucasia*.

Acknowledgements:

Don Buden very generously collected and donated a series of *J. orithya*; Kelvyn Dunn kindly allowed access to his unpublished field notes.

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Notable Range Extensions of Dragonflies in New South Wales – More Species in Victoria?

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Introduction

Theischinger & Hawking (2003) mentioned that *Griseargiolestes griseus* Hagen, *Petalura gigantea* Leach, *Austroaeschna obscura* Theischinger and *Cordulephya montana* Tillyard were recently collected only a few kilometers from the New South Wales/Victoria border. None of them was recorded from Victoria in the meantime, it should, however, only be a matter of time until this will happen.

Since 2003 records from south-eastern New South Wales of two more species, *Pseudagrion ignifer* Tillyard and *Acanthaeschna victoria* Martin, have become available that make their occurrence in Victoria more likely.

In the following the records that extend the known distribution of *P. ignifer* markedly further to the south and that make more believable a previously ignored record of *A. victoria* from Victoria are discussed. Finally details are given of a 17 years old record from Victoria of *Griseargiolestes eboracus* (Tillyard) whose occurrence in Victoria and taxonomic status were recently questioned. Some characters useful for the detection of the three species are discussed and illustrated.

***Pseudagrion ignifer* Tillyard, 1906 - Flame-headed Riverdamsel**

The first description given of the larva of supposedly *Pseudagrion ignifer* in Hawking & Theischinger (1999) was actually based on an exuvia of *Pseudagrion microcephalum*. Collecting macroinvertebrates for the Monitoring River Health Initiative (MRHI) between 1994 and 2000 in northern New South Wales and the subsequent study of the sampled dragonfly larvae, however, led to the discovery of the true larva of *P. ignifer* and to its presentation on the basis of this material (Theischinger & Hawking 2006). This made it possible to get more records of the species just from collecting larvae, without the need to collect adults.

All records of *P. ignifer* accumulated during MRHI are from north-eastern New South Wales and thus in agreement with the distribution of the species given, based on adults, in the comprehensive Australian dragonfly literature as NEQ, SEQ, NEN (=north-eastern Queensland, south-eastern Queensland, north-eastern New South Wales) (Watson *et al.* 1991, Theischinger & Hawking 2006).

Samples collected during the South Creek Catchment Biological Monitoring Program, which began in 2005, however, include numerous larvae of *Pseudagrion ignifer* from South Creek (western Sydney). The habitat is a rather polluted and disturbed urban stream, but *P. ignifer* is apparently not uncommon there together with several generally common species and *Zyxomma elgneri*, a crepuscular libellulid dragonfly which is otherwise uncommon in south-eastern New South Wales.

Habitats similar to South Creek are available along south-coastal New South Wales and another distributional quantum leap perhaps into Victoria does not appear impossible.

The characters that are sufficient to identify the larva of *P. ignifer* are: only one pair of large premental setae, a moderately produced premental ligula and subnodate caudal gills. They are presented in Figs 1-3.

***Acanthaeschna victoria* Martin, 1901 - Thylacine Darner**

Of the approximately 325 known species of Australian dragonflies (Theischinger & Hawking 2006), particularly of the 36 species of the Gondwanan family Telephlebiidae *sensu* Peters &

Theischinger (2007), *Acanthaeschna victoria* with its unusual morphology and coloration, adult and larval ecology, strange behaviour and at least partly crepuscular life-style (Theischinger 2000; Peters & Theischinger 2007) is probably the most enigmatic. Its apparent decline as discussed below is probably best expressed in the common name Thylacine Darner (Hawking & Theischinger 2002).

A. victoria was the first telephlebiid dragonfly introduced to science (Selys 1883) even though it was not formally described until almost 20 years later (Martin 1901). After that it took almost 80 years until its taxonomic status was cleared (Allbrook & Watson 1979) and more than 100 years until the first serious attempt was made to come to terms with its systematic position (Peters & Theischinger 2007).

As *A. victoria* was the first telephlebiid species introduced to science and as several specimens, now lodged in the famous nature museums of Brussels, Paris and London, were already available then, it appears that it may have been not particularly rare before 1900. Whereas, however, numerous specimens (adults and larvae) of all later described telephlebiid species became available over time, *A. victoria* was not observed or collected alive by an odonatologist (including the great R.J. Tillyard, J.A.L Watson and A.F.L. O'Farrell) until it turned up near Broadwater, New South Wales (approximately 29°01'S/153°24'E) in October 1999 in a habitat that was found bulldozed and totally destroyed 6 weeks after having successfully been sampled (Theischinger 2000). The very few specimens picked up in the twentieth century, and only in south-eastern Queensland and north-eastern New South Wales, by collectors of insect groups other than dragonflies had more or less been responsible that from 1979, the year of my second arrival in Australia, till 1999, the year of the "rediscovery" of *A. victoria*, most types of potential dragonfly habitats in this region were targeted (without success) and that the distribution of *A. victoria* was given as SEQ, NEN (=south-eastern Queensland, north-eastern New South Wales) in the major comprehensive works on Australian dragonflies, respectively telephlebiids (Watson *et al.* 1991, Theischinger & Hawking 2006, Peters & Theischinger 2007). This distribution was generally accepted, and occurrence in Victoria as given in some of the older literature (Martin 1909, 1911) and in south-eastern New South Wales was not considered valid, owing also to the fact that distributional information given at that time often reflected not or not only the provenance of the specimens.

It has to be considered an extreme coincidence that about ten days before the "rediscovery" of *A. victoria* in October 1999 a fully grown larva of the species was collected during MRHI/AusRivas collections at Wooli Wooli River (29.878°S/153.168°E), less than 100 km south of Broadwater. Because of the very peculiar morphological features of the specimen it was at first impossible to identify it as belonging to any known species. After some necessary dissections it was finally recognized and described as the larva of *A. victoria* (Theischinger 2000, 2002). This description presented the exciting possibility to find more evidence of the species independent of unsuccessful attempts of dragonfly specialists to collect the elusive adults.

And it happened: One of hitherto 446 samples collected during the Coastal Sustainable Rivers Audit (Coastal SRA) project, which began in 2006, was found to include the now second known larva of *A. victoria*. The sample was collected on November 29th 2007 at Cockwhy Creek (35.52105°S/150.31211°E) between Ulladulla and Batemans Bay by C. Rush and J. Miller. This record now extends the accepted range of *A. victoria* more than 300 km further south far into south-eastern New South Wales and suggests that the presence of the species even in Victoria may have to be reconsidered after all.

Conditions at the habitat, a black-water stream about 2-5 m wide with extensive detritus cover: water temperature = 18°C; conductivity = 280mS/cm; turbidity = 107 NTU, dissolved O2 = 4.6 mg/L; Alkalinity = 12.5 mg/L; pH = 5.5.

It appears now clear that the ecological specialisation of *A. victoria* for certain streams along the coast of at least southern Queensland and all of New South Wales, habitat that has been extensively transformed last century by human activities (now settlements, pasture and sugar cane country), lead to its becoming very rare. Particular care should therefore be taken to protect and conserve habitats similar to the one described above, better still larger areas including such habitats.

Diagnostic characters of the larva of *A. victoria* are: a single distinct tooth each side and some distance from the median cleft of the premental ligula and a broad conical epiproct (Figs 4-6).

Griseargiolestes eboracus **(Tillyard, 1913) - Grey-chested Flatwing**

When I came to Australia in 1966, *Griseargiolestes eboracus*, then known as *Argiolestes griseus eboracus* or even included under *A. griseus griseus* Hagen (Fraser 1960) was known only from north of the Hunter River, *Griseargiolestes griseus*, then *Argiolestes griseus griseus* or part of it, only from south of the Hunter. It was therefore a big surprise when in January 1977 L. Müller and I found *G. eboracus* at Kanangra Walls (33.98333°E/150.1333°S), less than 100 km W of Sydney. This record showed that *A. eboracus* and *A. griseus* were not as we previously assumed a pair of very closely related and allopatric species north respectively south of the Hunter River (Watson & Theischinger 1984).

Early in 1991, during one and the same collecting trip, I found *A. eboracus* at Delegate River/Bendoc Road (37.088109°S/148.791022°E) in Gippsland, Victoria, before we collected *A. intermedius* Tillyard close to Omeo along the Omeo Highway (ca 37°06'/147°36'E). The two findings together with available records of *A. intermedius* from the Snowy Mountains and ACT clearly showed a marked north/south overlap of these two species. Because of the Gippsland record the distribution of *A. eboracus* respectively *G. eboracus* was subsequently (Watson et al. 1991; Theischinger & Hawking 2003, 2006) given as "NEN, SEN, VIC" (=north-eastern and south-eastern New South Wales and Victoria). Unfortunately the diagnoses to distinguish between *A. eboracus* and *A. intermedius* given in the three books quoted above did not include details of thoracic color pattern and male genitalia. Even in Theischinger (1998a, b) - where the genus *Griseargiolestes* was established and some of its species were treated very thoroughly - those details of *G. intermedius* were not given. As a consequence and as *G. eboracus* could not be confirmed by fresh records in Victoria, some Australian odonatists cast doubt not only on the presence of *G. eboracus* in Victoria but also on its taxonomic status. Photographs of preserved specimens and live individuals are therefore given below together with more elaborate verbal diagnoses of *G. eboracus* and *G. intermedius*. They give some evidence that *G. intermedius* is more closely related to *G. griseus* than to *G. eboracus*. *G. griseus* and *G. eboracus* coexist in places (e.g. Kanagra Boyd) and coexistence of *G. eboracus* and *G. intermedius* somewhat further south appears quite possible. *G. eboracus*, the *Griseargiolestes* species with the largest north-south range, patchy though because of its ecological specialization for boggy seepages and sphagnum bogs, obviously shows some geographical variability, yet before molecular analysis there are no reasons to split it. Since 1991 *G. eboracus* was also found in Deua National Park (35°52'S/149°48'E), Badja State Forest (ca 36°S/149.5°S) and Nunnock swamp in Glenbog State Forest (36.71667°S/149.45°E) so that its Victorian record now appears much less out of line.

In addition to the pruinescence differences between adult *G. eboracus* (only front of synthorax, as in Fig.9) and *G. intermedius* (almost the whole insect, as in Fig. 10) there are consistent differences in shape and coloration of the pterostigma and in the synthoracic color pattern: The pterostigma is generally markedly paler with the posterior side approximately twice as long as proximal or distal side in *G. eboracus* (Fig. 7), markedly darker with the posterior side only approximately 1.5 times as long as proximal or distal side in *G. intermedius* (Fig. 8). The yellow patch along the intersegmental suture is subtriangular and the dorsal two thirds of the adjacent black bar are almost parallel sided in *G. eboracus* (Figs 11, 12), whereas the yellow patch is anterodorsally rather evenly curved and at least the dorsal third of the black bar is distinctly conical in *G. intermedius* (Fig. 13).

The research for the above distribution data involved all presently recognized seven species of *Griseargiolestes*. Unfortunately the consultation of data bases that are available on the Internet painted a twisted picture of the distribution of five of them. This resulted from misidentifications and from the fact that in cases the same or nearly the same localities were entered with their geographical co-ordinates 2-3° different. In a genus distributed with several species mainly along the largely north-south directed Great Dividing Range in eastern Australia this can change known geographic ranges dramatically. Hopefully such lapses that show that field experience is still important, even and particularly, after the rise of databases, will not find their way into future publications.

Discussion

It is clear that the above findings do not necessarily represent range extensions caused by climate change. They only confirm the paucity of particularly distributional information on Australian dragonflies. This is not surprising as there were never more than a very few dragonfly collectors in Australia, a continent the size of Europe. As a comparison there are hundreds of dragonfly enthusiasts in Netherlands, a country 200 times smaller.

The available information on the larvae of *P. ignifer* (Theischinger & Hawking 2006) and *A. victoria* (Theischinger 2000, 2002), is sufficient to identify these dragonflies to species level. In many other situations this is not the case, and adult collecting is still absolutely necessary for many species level identifications of Australian dragonflies.

The paragraphs on *P. ignifer* and *A. victoria* underline the significance of projects like MRHI, South Creek Study and Coastal SRA in New South Wales and of the same or similar projects in other states, not only for river health issues but also for basic and descriptive science, zoogeographical research and studies of biodiversity, phylogeny and evolution, and future conservation issues. Furthermore, the continuation of these collection programs, together with other information - as recently being compiled (Theischinger & Endersby in prep.) – has great potential for assessment of the actual and potential impacts discussions of global warming and climate change. And these projects are at the present based on results from studying the larvae only.

The paragraph on *G. eboracus* shows that even existing distributions based on previous identifications of the adults of taxonomically difficult genera should be treated with caution, especially in this case where the larvae rarely occur in stream samples.

Acknowledgements

I wish to thank the New South Wales SRA team, past and present, including S. Claus, M. Huxley, S. Jacobs, D. Mawer, J. Miller, L. Miller, C. Rush and S. Tang, for paying particular attention to dragonfly larvae and to I. Endersby, L. Müller and R. Richter for providing valuable information and photos.

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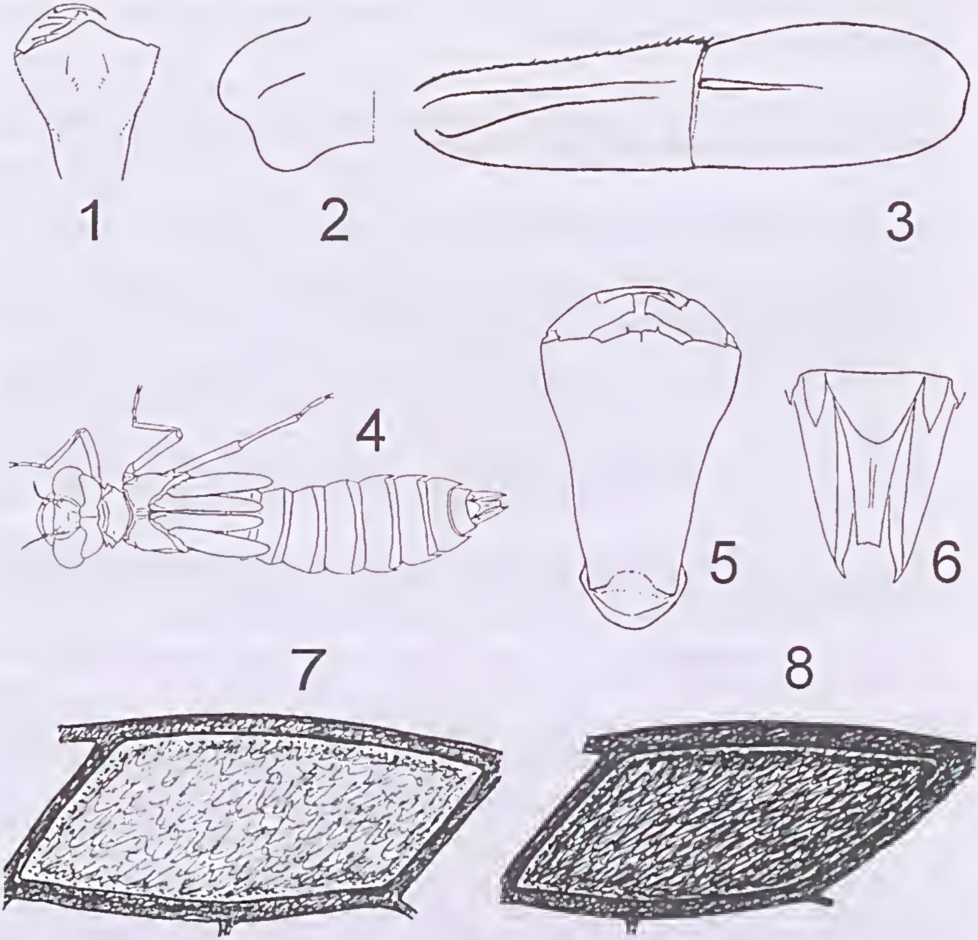

Figs 1-3. *Pseudagrion ignifer* Tillyard, final instar larva: (1) prementum, dorsal; (2) postocular lobe, dorsal; (3) median caudal gill, lateral. Figs 4-6. *Acanthaeschna victoria* Martin, male final instar larva: (4) dorsal; (5) prementum, ventral; (6) anal pyramid, dorsal.Figs 7, 8. Pterostigma of the right forewing: (7) *Griseargiolestes eboracus* (Tillyard); (8) *Griseargiolestes intermedius* (Tillyard).

Figs 9, 11, 12. *Griseargiolestes eboracus* (Tillyard): (9) mature male, photo L. Müller; (11, 12) thorax, lateral, photo G. Theischinger: (11) from Delegate River/Bendoc Rd Victoria; (12) from Boonoo Boonoo State Forest, New South Wales. Figs 10, 13. *Griseargiolestes intermedius* (Tillyard): (10) mature male; photo R. Richter;(13) thorax, lateral; photo G. Theischinger.

Aglaosoma variegata (Walker) Recorded at Raymond Island, Eastern Victoria

Andrew Bould, Raymond Island

On the 24th June 2007, I was walking around our back garden when a flash of bright metallic blue caught my attention and I found a caterpillar approximately 40mm in length with white body segments dotted with black on the upper and more densely on the underside.

At first glance I thought it was a larva of an Anthelidae moth as they are often found on the ground. However, all pinacula on the thorax and abdomen exhibited a brilliant sapphire blue-green, a color I have not observed on caterpillars before. From each pinaculum protruded a sharp setae hair approximately 3mm long and bluish black in color. Long, light brown hairs protruded around the thorax and abdomen reducing in length along the thorax. Smaller dorsal tufts of golden hair were present on each thorax segment. The head was pronounced, brown and sparsely hairy.

I photographed the caterpillar and emailed the images the Discovery Centre, Museum Victoria for identification.

Fig. 1 *A. Variegata* larva, 31 July 2007

Fig. 2 Close-up of larval pinaculae

Fig. 3 *A. Variegata* cocoon, 30 August 2007

Fig. 4 *A. Variegata* pupal case, 9 December 2007

Fig. 5 *A. Variegata* Adult, 9 December 2007

The returned email from Simon Hinkley stated 'I would have thought with such a distinctive and spectacular larva that it would be in a book somewhere or someone here at the Museum would have seen it before but unfortunately we haven't. It may be a species from the family Notodontinae or Lymantriidae.'

I decided to rear the caterpillar to adult moth to assist with identification. As with all moth larvae I collect, my first objective is to identify the food plant(s) from available habitat in the area the larva was collected. Initially, as it was found on the ground, I assumed the food plant to be grasses or tussocks and *poa.* sp tried but no interest was shown in them by the caterpillar.

A closer look at other potential food plants in the area revealed, *Eucalyptus tereticornis* (Forest Red Gum), *E. bosistoana* (Coast Grey Box), *Banksia marginata* (Silver banksia), *B. integrifolia* (Coast banksia), *B. spinulosa* ssp, *Allocassuarina littoralis* (Black sheoke), *Acacia longifolia* ssp (Sallow wattle), *A. melanoxylan* (Blackwood) and *Grevillea* sp. The caterpillar initially responded to *Grevillea* and not to any other plant. After a few days with minimal leaf consumption, the caterpillar took a preference to *Acacia longifolia* ssp as its main food plant and occasionally *Banksia spinulosa* ssp. On the 25th July, one month after collection, the larva underwent a moult or ecdysis and the resulting larval instar was similar to the previous stage but with large plumed golden dorsal tufts forming a diamond pattern.

The caterpillar roamed for 3 days from the 22nd August looking for what I thought was a pupation site. However, on the 25th August, the larva again moulted with very few changes in appearance to the previous instar. The next day, the 26th August, the caterpillar went to ground in leaf litter pupating in a bag-like cocoon approximately 40mm long and 20mm across. The cocoon was covered in golden brown hairs. It was unusual for pupation to occur after only one day from ecdysis. On the 9th December, an adult male moth emerged from the cocoon.

Fore-wings were mostly white with black blotches and radial lines and uniform dull light brown hind-wings. The head was heavily covered with brown hair tufts and the body a light brown to white. When disturbed, the moth feigned death by rolling onto its side and staying motionless for several minutes.

From Commons – Moths of Australia, I was able to identify the moth as *Aglaosoma variegata* Pl 17.6 (Family Thaumetopoeidae). Common also states that it is 'common from Mossman and the Atherton Tableland, northern Queensland, to southern coastal New South Wales. It has been taken at Mildura, north-western Victoria, where it may have been introduced.' The larva is also shown on Pl 30.7 and the blue spots are evident as it is at a similar instar as to when I first collected the larva.

After photographing the moth and releasing it, I forwarded the images to the Discovery Centre, Museum Victoria and my identification was confirmed by Simon Hinkely. Photographs of the larva, close-up of pinaculae, cocoon, pupal case and adult are shown in figures 1 to 5.

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Discovery Centre, Museum Victoria

Some Thoughts on Biological Indicators of Climate Change Adaptation – What Attributes Should the Monitors have?

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Biological indicators have featured fairly prominently in surveys of climate change impacts. These range from plants to birds, butterflies and dragon flies. So far, indicators have largely taken advantage of existing historical information. This is why some birds and butterflies have featured so prominently because there are good historical records based on extensive observations made by amateur groups. However this does not mean that such species will make the best indicators. As agencies start to focus on climate change adaptation, it is becoming increasingly important to provide monitoring tools that can assist in making management decisions. We are moving beyond the stage where it is only of interest to monitor changes.

What types of objectives might be met by biological indicators of climate change adaptation? Which biological groups can best meet these objectives?

Bioindication and climate change adaptation objectives

As climate change starts to influence thermal extremes, average temperature, rainfall patterns and the timing of weather events, there is a need to monitor the extent to which ecosystems are being placed under stress and specific species are threatened as well as the effectiveness of any adaptation program.

Objective: conserve threatened species under climate change. Indicators may have two roles here. First, they may themselves be threatened and responding to climate change. For instance, Golden sun moths in Victoria are listed as threatened because they occur in isolated areas. Their emergence times are dramatically changing and this is at least phenologically linked to temperature in the month of emergence. If emergence is pushed forward too far, there may be consequences for golden sun moths completing their life cycle particularly in synchronization with their hosts. Second, indicators may serve as food for threatened species. In this case, the timing of food supply becomes critical as well as the abundance of the food. For instance, threatened populations of mountain pygmy possum in Victoria rely on Bogong moths that migrate to the alps to over summer. If populations of these moths crash, it becomes difficult for the possums to build up fat reserves for hibernation.

Objective: ensure that refugia are identified. When climate change occurs, many animals and plants contract to refugia that might represent areas where thermal extremes are avoided and/or where moisture is maintained. Refugia typically contain physiologically sensitive species with restricted distributions that can only persist in narrowly defined environments. Species from biodiverse groups typically differ markedly in physiological resistance and this feature could be used to identify refugia.

Objective: Ensure connectivity for movement and evolution. Species that are unable to tolerate changing conditions will be required to move along corridors and wider zones that ensure movement of large populations capable of countering demographic stochasticity and maintaining evolutionary potential. Many species with limited movement potential and narrow tolerance ranges may need to use these corridors and could act as indicators.

Objective: Maximize the health of freshwater environments: One of the main threats of climate change is to water flows, because small reductions in rainfall can translate into large changes in runoff. There are well established indicators particularly macroinvertebrate groups that can act as indicators of healthy flow levels.

Objective: Identify terrestrial ecosystems under stress, Ecosystems need to be identified might be reaching a stage where they are no longer resilient to counter the effects of climate change. Groups of organisms that rapidly respond to stressful situations can be used as indicators.

Objective: Plan for threats arising from climate change. Many species are pests of agriculture and vectors of diseases that influence human and livestock health. A concern of climate change has been predicting the spread of vectors and pests, although species may also contract. Models have already considered the potential spread of mosquito vectors of disease, shifts in fruit fly pests of horticulture and so on.

Meeting the objectives

Biological indicators can play an important role in meeting these objectives. Where species are threatened or essential food for threatened species, their abundance, phenology and distribution need to be monitored as part of conservation efforts. Where species are major pests or disease vectors, the same considerations apply. To meet the other objectives, monitoring efforts will also focus largely around species distribution shifts and phenology. To identify ecosystems under stress, shifts in targeted groups of species/communities could form the basis for monitoring. What attributes should monitors have in these situations?

Desirable qualities of indicators for monitoring – distribution shifts and phenology

- A well defined distribution that has a defined border linked to a climate gradient. Species with limited latitudinal or altitudinal distributions fit this requirement well.
- A low migration rate but with sufficient movement to track changing climatic conditions. For instance, wingless insects might be better than winged species. Species that are passively moved and that "sample" new environmental space as they move through a landscape could be useful in this respect.
- A common species, and preferably one that can be easily collected through standard approaches.
- A species with a limited ability to adapt through rapid evolution (unless this can be scored easily-adaptive changes form quite a different type of monitor).
- A low level of plasticity/acclimation ability.
- Good understanding of species at physiological level. We ideally need to be able to apply mechanistic models to understand the role of climate change and then predict distributions and phenological changes. Again this information needs to be established across life cycle stages.
- Lower trophic levels including herbivores rather than higher trophic levels. The distribution of these species is more directly related to climatic variables.
- Short generation time. These organisms are more likely to respond quickly.
- Potentially culturable and manipulatable in transplant/common garden experiments. This makes physiological experiments easier, and it then also becomes possible to separate genetic from plastic effects.
- A well defined taxonomy and limited potential for hybridization.
- Relatively large species. This means that records can more easily be obtained for monitoring distributions. And volunteer organisations are more likely to participate in data collection.
- Member of a group of related species with different susceptibilities to climatic factors, linked to differences in physiological responses.

Minutes of the Council Meeting 15 July 2008

Meeting opened 5:10pm

Present:	P. Lillywhite, I. Endersby, P. Marriott, P. Carwardine, D. Dobrosak
Apologies:	S. Curle, K. Walker, M. Birtchnell

Minutes:
Minutes of the previous Meeting [*Vic. Ent.* 38(2): 10] were accepted. I. Endersby moved, P. Carwardine seconded.

Correspondence:

- Planet domain changes advising changed security.
- John Tann: Atlas of Living Australia Survey
- Department of Prime Minister and Cabinet, Order of Australia – Request for Nominations. Council seeks members to put forth nominations for discussion at the next Council meeting.
- Further correspondence from Prof. Hoffman regarding climate change and use of invertebrate taxa as indicators.

Treasurers Report: :

General account $5815, Le Souëf account $5096. 10 Members are still outstanding. Two people have paid up from last year. Treasurer's report was accepted. I. Endersby moved, P. Carwardine seconded.

Editors report:

D. Dobrosak to prepare the August issue while M. Birtchnell completes her Thesis. The next issue will contain a double sided colour sheet. Additional envelopes are required.

General Business:

I. Endersby's Booklet on Collecting is near completion. Text is completed and D & A .Dobrosak to finish line drawings.

P. Marriot's Booklet on Moths. A Grant application has been submitted. T. Edwards has meticulously edited the booklet and his assistance has been invaluable and much appreciated.

Forum for data recording:

Three or four groups of people will give prepared presentations. After the presentation of each item there will be open discussion.

Promotional Flyer

Council deliberated on the Society's promotional flyer. Ian prepared an updated version. 100 copies on colour paper can be printed for $15.

Replacement Treasurer

Members are reminded that Ian Endersby will not stand next year. Members should consider if they are able to take on this task.

Success of Last meeting: It was pleasing to see a large attendance at the last meeting. Council acknowledges Peter Lillywhite and Catriona McPhee's invaluable assistance in making the meeting the success it was.

Program for 2009: Council deliberated on next year's program. Members are requested to contact any of the Society's office bearers with suggestions for speakers or topics.

Next Meetings:

2008:			
Month	Date	Planned event	
August:	19th	Members meeting	Forum for data recording meeting
September:	16th	Council meeting	
October:	21st	Members excursion	Excursion. Visit to AQIS at Tullamarine.
November:	18th	Council meeting	
December:	9th	Members meeting	Please note, December's meeting date is 2nd Tuesday of December to try and avoid Christmas celebrations.

Meeting closed at 6:10

Australian Journal of Entomology 47 (2) 14 April 2008

The Australian Entomological Society publishes the *Australian Journal of Entomology* quarterly. The Entomological Society of Victoria is an affiliated society and will, in future, publish the contents of the Journal for the wider interest of its members.

SYSTEMATICS

Courtenay N Smithers, George Nigel Forteath & Andrew Osborn: A new species of *Sisyra* Burmeister (Insecta: Neuroptera: Sisyridae) from Lake Pedder, Tasmania

Karen L Bell & T Keith Philips: Four new species of the myrmecophile *Diplocotes* Westwood (Coleoptera: Ptinidae) from Queensland and South Australia

Chris A M Reid & Simon C Nally: Revision of the genus *Menippus* Clark in Australia (Coleoptera: Chrysomelidae: Galerucinae)

Jenny J Beard: A new species of spider mite, *Oligonychus palus* sp. nov. (Prostigmata: Tetranychidae), from tropical Australia

Murray J Fletcher: A key to the genera of Ricaniidae (Hemiptera: Fulgoromorpha) recorded in Australia with notes on the Australian fauna, including a new species of *Epithalamium* Kirkaldy

BEHAVIOUR

Alan L Bishop, Harry J McKenzie & Lorraine J Spohr: Attraction of *Culicoides brevitarsis* Kieffer (Diptera: Ceratopogonidae) and *Culex annulirostris* Skuse (Diptera: Culicidae) to simulated visual and chemical stimuli from cattle

PEST MANAGEMENT

Mark Disbury, Rachel P Cane & Richard C Russell: Remote identification of exotic mosquito specimens using digital photography

Andréa E A Stephens, Anne M Barrington, Vicky A Bush, Nadine M Fletcher, Vanessa J Mitchell & D Max Suckling: Evaluation of dyes for marking painted apple moths (*Teia anartoides* Walker, Lep. Lymantriidae) used in a sterile insect release program

Yizhong Yang, Marie-Louise Johnson & Myron P Zalucki: Possible effect of genetically modified cotton on foraging habits of early instar Helicoverpa armigera (Hübner) (Lepidoptera: Noctuidae) larvae

Brian H Kay, Tonya M Watson & Peter A Ryan: Definition of productive *Aedes notoscriptus* (Diptera: Culicidae) habitats in western Brisbane, and a strategy for their control

INSECT REARING

Clare E Holleley, Ailsa D Hocking, Tracey L Schubert & Michael R Whitehead: Control of *Penicillium roqueforti* (Thom) infection in cultures of *Drosophila melanogaster* (Meigen) (Diptera: Drosophilidae)

PHYSIOLOGY

Mary T Fletcher, Peter G Allsopp, Matthew J McGrath, Sharon Chow, Oliver P Gallagher, Craig Hull, Bronwen W Cribb, Christopher J Moore & William Kitching: Diverse cuticular hydrocarbons from Australian canebeetles (Coleoptera: Scarabaeidae)

BIOLOGICAL CONTROL

Andrew P Davies & Myron P Zalucki: Collection of *Trichogramma* Westwood (Hymenoptera: Trichogrammatidae) from tropical northern Australia; a survey of egg parasitoids for potential pest insect biological control in regions of proposed agricultural expansion

OFFICE BEARERS

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The Society welcomes contributions of articles, papers or notes pertaining to any aspect of entomology for publication in this Bulletin. Contributions are not restricted to members but are invited from all who have an interest. Material submitted should be responsible and original. The Editor reserves the right to have articles refereed. Statements and opinions expressed are the responsibility of the respective authors and do not necessarily reflect the policies of the Society.

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DIARY OF COMING EVENTS

Tuesday August 19th
Forum for data recording

Tuesday September 16th
Council meeting

Tuesday October 21th
Excursion. Visit to AQIS at Tullamarine

Scientific names contained in this document are *not* intended for permanent scientific record, and are not published for the purposes of nomenclature within the meaning of the *International Code of Zoological Nomenclature*, Article 8(b). Contributions may be refereed, and authors alone are responsible for the views expressed.

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